

WHAT IS CLAIMED IS:

1. A lamp comprising:  
an LED module including at least one LED arranged on a substrate;  
an optical system comprising at least one lens in optical communication with the LED module; and  
a zoom apparatus that selectively adjusts the relative axial separation of the optical system and the LED module.
2. The lamp as set forth in claim 1, wherein the LED module comprises:  
a plurality of LED's arranged in a first pattern on the substrate.
3. The lamp as set forth in claim 2, wherein the at least one lens comprises:  
a plurality of Fresnel lens arranged in a second pattern that corresponds with the first pattern.
4. The lamp as set forth in claim 2, wherein the optical system comprises:  
a plurality of lenses wherein each lens is axially aligned with an LED and optically communicates with said LED.
5. The lamp as set forth in claim 1, wherein the zoom apparatus comprises:  
a first sleeve having the LED module arranged thereon, the first sleeve further having a first threading arranged thereon; and  
a second sleeve having a second threading arranged thereon that is adapted to cooperate with the first threading such that the first sleeve and the second sleeve are relatively movable in a screwing fashion, the second sleeve further having the optical system arranged thereon.
6. The lamp as set forth in claim 5, further comprising:

an index system that relatively biases the first sleeve and the second sleeve into one or more selectable relative axial positions.

7. The lamp as set forth in claim 1, wherein the zoom apparatus comprises:

a first element having the LED module disposed thereon; and

a second element adapted to slidingly connect with the first element, the second element further having the optical system disposed thereon.

8. The lamp as set forth in claim 7, wherein the zoom apparatus further comprises:

a mechanical interlock between the first and the second elements that prevents relative rotation therebetween.

9. The lamp as set forth in claim 8, wherein the mechanical interlock comprises:

a protrusion on one of the first and the second elements, the protrusion being aligned parallel to the optical axis; and

a groove on one of the first and the second elements that receives the protrusion to prevent relative rotation of the first and the second elements.

10. The lamp as set forth in claim 7, further comprising:

a stop that relatively biases the first and the second elements into one or more selectable relative axial stop positions.

11. The lamp as set forth in claim 1, wherein the LED module further comprises:

a heat sink thermally connected with the substrate for cooling the LED module.

12. A light source comprising:

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an LED module including a plurality of LED's for generating a lamp beam;  
and  
an adaptive optical system for selectively adjusting the angular spread of the lamp beam.

**13.** The light source as set forth in claim **12**, wherein the adaptive optical system comprises:

a plurality of lenses; and

one of:

two slidably interconnected sleeves, and

two threadedly interconnected sleeves,

the first sleeve being connected with the LED module, and the second sleeve being connected with the plurality of lenses.

**14.** The light source as set forth in claim **12**, wherein the adaptive optical system comprises:

a plurality of lenses;

two cylindrical threadedly interconnected sleeves, the first sleeve connected with the LED module, and the second sleeve connected with the plurality of lenses; and

a mechanical index system that biases the threaded interconnection of the two sleeves into selectable stop positions.

**15.** The light source as set forth in claim **14**, wherein the selectable stop positions include:

stop positions that axially align each LED of the LED module with one of the plurality of lenses.

**16.** The light source as set forth in claim **12**, wherein the adaptive optical system comprises:

a plurality of lenses arranged into an n-fold rotationally symmetric pattern corresponding to a rotational symmetry of the arrangement of the plurality of LED's;

two cylindrical threadedly interconnected sleeves, the first sleeve having the LED module disposed therein, and the second sleeve having the plurality of lenses disposed therein; and

a stop mechanism that biases the threaded interconnection of the two sleeves into selectable stop positions that are angularly separated by integer multiples of  $360^\circ/n$  degrees, where n corresponds to the n-fold rotational symmetry of the arrangement of the plurality of lenses.

**17.** A lamp comprising:

a light source;

an optical system comprising at least one lens in optical communication with the light source; and

a zoom apparatus that selectively adjusts the relative axial separation of the optical system and the light source.

**18.** The lamp as set forth in claim 17, wherein the zoom apparatus comprises: one of:

two slidably interconnected sleeves, and

two threadedly interconnected sleeves,

the first sleeve having the light source arranged thereon, and the second sleeve having the optical system arranged thereon.